WDFW Review of Public Comments Received on Puget Sound HGMPs
June 18, 2003 through August 1, 2003 Comment Period

WDFW provided 79 Hatchery Genetic Management Plans (HGMPs) covering Puget Sound artificial production programs for public comment in the period from June 18, 2003 through August 1, 2003. The HGMPs describe, in a format prescribed by NOAA Fisheries, the operation of each artificial production program for salmon and steelhead in the Puget Sound region and the potential effects of each program on listed species. The HGMPs have been provided to NOAA Fisheries for consideration as significant conservation measures under Section 4(d) of the Endangered Species Act.

A total of 24 individuals or organizations subsequently provided comments to WDFW during the public comment period. The comments ranged from short paragraphs to extensive reviews, all of which are available in their entirety on the WDFW website at the following address: http://www.wa.gov/wdfw/hat/hgmp/.

WDFW has provided a summary of the comments to promote a broad review by NOAA Fisheries and others interested in Puget Sound artificial production programs. Many comments were applicable to multiple HGMPs and, to minimize redundancy, are grouped according to the section of the HGMP to which they are applicable. WDFW has also provided a response to each of the summarized comments and identified, as needed, enhancements to HGMPs. These enhancements will be provided to NOAA Fisheries during the next year in an iterative, ongoing process leading to a Final Environmental Impact Statement. The Final Environmental Impact Statement is currently expected to be issued in the spring of 2005.

Index to Comments

1.0 HGMP Section 1 (General Program Description), General Comments

Comment 1. Each HGMP should include an executive summary to facilitate public review.

Response. NOAA Fisheries has indicated that the purpose of Section 1 of the HGMP is to provide a summary of the program. However, WDFW agrees that Section 1 is difficult to follow, and an executive summary may be an excellent way to provide a succinct description of the hatchery program. A potentially complementary option under consideration by WDFW is to provide web access to a succinct summary as well as the complete HGMP.

Comment 2. Funding source, staffing level, and annual hatchery program operating costs are not provided.

Response. The format for the HGMP was developed to serve a variety of purposes ranging from regulatory requirements associated with the Endangered Species Act (ESA) to funding requests to the Bonneville Power Administration (Smith 2000). Consultation with NOAA Fisheries staff (Tim Tynan, pers. comm.) indicates that the request for information on staffing and operating costs in the HGMP was included at the request of BPA, and that it is not used by NOAA Fisheries in ESA related evaluations. WDFW recognizes that information on operating costs may be of interest to other entities and will include it as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 3. Performance indicators are not categorized into those associated with program risks and program benefits.

Response. WDFW will identify each indicator as related to either program risks or program benefits as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 4. Program goals, justifications, performance standards and indicators are not described in sufficient detail.

Response. Section 1 of each HGMP provides a general description of the hatchery program, including program goals, performance standards, and indicators. The format and conventions used by WDFW in the program descriptions were derived from the guidance provided in the HGMP template (NOAA Fisheries, August 7, 2002). A comparison of a HGMP from a representative program (the Samish Hatchery Summer/Fall Chinook Fingerling) illustrates the consistency of the types of information provided by WDFW and the HGMP template (Table 1).

The Hatchery Science Review Group (HSRG 2003) has noted that well-defined program goals and performance measures provide an important foundation for fostering continued improvements in hatchery management. WDFW concurs, and has initiated an effort that extends beyond the requirements of the ESA to provide specific, numeric performance measures for key program characteristics. These are expected to include, as suggested by several respondents,

Table 1. Comparison of the guidance and examples included in the template and several components of the HGMP program description for a representative program (the Samish Hatchery Summer/Fall Chinook Fingerling program).

HGMP Section	NOAA Fisheries HGMP Template Guidance	Samish Hatchery Summer/Fall Chinook Fingerling
1.6 Type of program	Define as either: Integrated Recovery; Integrated Harvest; Isolated Recovery; or Isolated Harvest	Isolated Harvest
1.7 Purpose (Goal) of program	Define as either: Augmentation, Mitigation, Restoration, Preservation/Conservation, or Research. Example: "The goal of this program is the restoration of spring chinook salmon in the White River using the indigenous stock."	Augmentation. The goal of this program is to provide summer/fall chinook for harvest opportunity. This hatchery stock is deemed not essential for recovery.
1.8 Justification for the program.	Indicate how the hatchery program will enhance or benefit the survival of the listed natural population (integrated or isolated recovery program, or how the program will be operated to provide fish for harvest while minimizing adverse effects on listed fish (integrated or isolated harvest programs).	This program will be operated to provide fish for harvest while minimizing adverse genetic, demographic or ecological effects on listed fish. This will be accomplished in the following manner: 1) Juvenile chinook will be released as smolts to minimize emigration time to saltwater thereby minimizing potential competition with and predation on natural-origin fish. 2) Juvenile chinook will be released after the usual wild chinook emigration time to minimize potential adverse interactions. 3) All juvenile chinook released will be acclimated at a hatchery facility capable of trapping the majority of returning adults. This practice will minimize straying and make possible the removal or regulation of hatchery fish allowed to spawn naturally. 4) All juvenile chinook will be mass marked with an adipose fin clip to distinguish them from wild or

		naturally spawning chinook. 5) Adult chinook produced from this program will be harvested at a rate that allows adequate escapement of listed chinook.
1.9 List of program "Performance Standards"	"Performance Standards" are designed to achieve the program goal/purpose, and are generally measurable, realistic, and time specific. Example: "(1) Conserve the genetic and life history diversity of Upper Columbia River spring chinook populations through a 12 year duration captive broodstock program; (2) Augment, restore and create viable naturally spawning populations using supplementation and reintroduction strategies; (3) Provide fish to satisfy legally mandated harvest in a manner which minimizes the risk of adverse effects to listed species; (4)…."	Performance standards: 1) Produce adult fish for harvest; 2) Meet hatchery production goals; 3) Manage for adequate escapement where applicable; 4) Minimize interactions with listed fish through proper broodstock management and mass marking. Maximize hatchery adult capture effectiveness. Use only hatchery fish; 5) Minimize interactions with listed fish through proper rearing and release strategies; 6) Maintain stock integrity and genetic diversity; 7) Maximize in-hatchery survival of broodstock and their progeny; and limit the impact of pathogens associated with hatchery stocks on listed fish; 8) Ensure hatchery operations comply with state and federal water quality standards through proper environmental monitoring.
1.10 List of program "Performance Indicators", designated by "benefits" and "risks".	"Performance Indicators" determine the degree that program standards have been achieved, and indicate the specific parameters to be monitored and evaluated. (e.g., "Evaluate smolt-adult return rates for program fish to harvest, hatchery broodstock, and natural spawning.", "Evaluate predation effects on listed fish resulting from hatchery fish releases.")	Performance indicators: 1) Survival and contribution rates; 2) Number of juvenile fish released; 3) Number of broodstock collected; 4) Stray rates; 5) Sex ratios; 6) Age structure; 7) Timing of adult collection/spawning; 8) Adherence to spawning guidelines; 9) Total number of wild adults passed upstream; 10) Juveniles released as smolts;

		11) Out-migration timing of listed fish/hatchery fish; 12) Size and time of release; 13) Effective population size; 14) Hatchery-origin recruit spawners. 15) Fish pathologists will monitor the health of hatchery stocks on a monthly basis and recommend preventative actions/strategies to maintain fish health; 16) Fish pathogologists will diagnose fish health problems and minimize their impact; 17) Vaccines will be administered when appropriate to protect fish health; 18) A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings; 19) Fish health staff will present workshops on fish health issues to provide continuing education to hatchery staff; 20) NPDES compliance.

performance measures related to the proportion of fish on the spawning grounds originating from hatchery production and smolt-to-adult survival rates for hatchery releases.

Comment 5. Fish per pound (FPP) is not a useful metric of fish size and is not readily converted to length.

Response. WDFW believes that several advantages are associated with using FPP as the metric for performance measures related to the size of fish released from a hatchery. These include:

a) familiarity - it is a standard metric that hatchery workers apply on a routine basis to monitor fish growth; and
b) generality - it is widely reported in the fisheries literature.

Other metrics may be more useful for other analyses or applications. For example, the length in millimeters of fish released from hatcheries was used by WDFW in some analyses assessing the potential risk of predation. When conversion from FPP to length in millimeters is required, WDFW typically relies upon the tables in Piper et al. (1982). To simplify HGMP review, WDFW will provide both FPP and length information as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 6. The risk minimization measure for harvest management ("adequate escapement of listed chinook") is not sufficiently specific.

Response. The risk minimization measure will be modified to reference the appropriate resource management plans or permits for fishery harvest approved by NOAA Fisheries as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 7. Information on the escapement of hatchery-origin fish to natural spawning areas is not provided in Section 1.12.

Response. Both Section 1.12 and Section 2.2.2 of the HGMP template appear to request information on the escapement of hatchery origin fish to natural spawning areas. The explanatory text for Section 1.12 requests "escapement number (to the hatchery and natural areas)"; Section 2.2.2 requests information on the "annual proportion of direct hatchery-origin and listed natural-origin fish on natural spawning grounds". To minimize the presentation of redundant information in the HGMP, WDFW has typically provided available data on escapement to the hatchery in Section 1.12, and escapement to natural spawning areas (natural and hatchery-origin) in Section 2.2.2. WDFW agrees that additional documentation of escapement may be helpful in Section 1.12, and will include it as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 8. The NOAA Fisheries template for HGMPs requires the development of alternative program actions.

Response. The Puget Sound Salmon Management Plan, a federal court order, describes the comanagement responsibilities of WDFW and the tribes with regard to fishery management and artificial production. The PSSSMP explicitly states that "no change may be made to the equilibrium brood document without prior agreement of the affected parties." The information request stated in the HGMP template is "Indicate alternative actions considered (underline added) for attaining program goals, and reasons why those actions are not being proposed." Given the legal obligations of comanagement identified in the PSSSMP, WDFW has interpreted "considered" to mean any program modification that was discussed formally with the tribes. Examples of programs where comanagement consideration has been given to alternative programs include the NF Nooksack Native Chinook Restoration program and the Dungeness Chinook program. WDFW will include a discussion of this approach as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

2.0 HGMP Section 2 (Program Effects on Listed Populations), General Comments

Comment 9. The HGMPs must provide a numerical estimate of the direct and indirect take associated with each hatchery program.

Response. The conventions used by WDFW for providing information on projected take are consistent with those of other permitted programs and the information request stated within the HGMP template. Section 2.2.3, part 3 of the HGMP states: "Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) (underline added) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take." WDFW provides estimates of projected take associated with broodstock capture, handling, or other actions that lead to a direct, quantifiable take. As described in the HGMPs, the indirect effects of hatchery production, such as predation and competition, are highly uncertain. Although the HGMPs discuss our current understanding of the potential effects of these indirect factors, it is not currently feasible to quantify the associated take.

A review of other approved permits on the NOAA Fisheries web site indicates that this approach is not unique to HGMPs. For example, the biological opinion for the "10 Categories of Forest Service and Bureau of Land Management Programmatic Activities in Northwestern Oregon" (NMFS 2003) states:

> "Effects of actions such as these are largely unquantifiable because take is in the form of habitat modification. Quantifying take associated with habitat modification is problematic because of the complexity of cause and effect relationships. Therefore, even though NOAA Fisheries expects some low level of incidental take to occur due to the actions covered by this opinion, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take to the species. In instances such as these, NOAA Fisheries designates the expected level of take in terms

of the extent of take allowed. Allowed take is limited to take resulting from the actions as proposed (including project design criteria), that occurs within the action area. Take that occurs from actions that exceed the range of effects analyzed in the BA, that do not follow the PDCs, or that extends beyond the action areas is not authorized by this Opinion."

3.0 HGMP Section 3 (Relationship to Other Management Objectives), General Comments

Comment 10. The relationship of the HGMP to other hatchery plans, court orders, and agreements (sections 3.1 and 3.2) is not satisfactorily addressed.

Response. WDFW agrees that additional information may be helpful in understanding the context in which the program operates. WDFW intends to provide additional information in sections 3.1 and 3.2 on the relationship of the HGMP to the Puget Sound Salmon Management Plan (including the Future Brood Document), hatchery and harvest resource management plans, and other court orders or agreements as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 11. Insufficient information is provided on the fishery benefits accruing from programs or, if the information is lacking, how the data limitations will be addressed.

Response. WDFW typically included general information on the fisheries benefiting from the program in Section 3.3.1 and identified marking and tagging needs in Section 11.1. We agree that additional information on contribution and harvest rates would be useful and will incorporate it as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 12. Insufficient information is provided on the major factors affecting natural production and habitat protection and restoration efforts.

Response. Assessing the habitat factors limiting natural production, identifying and implementing habitat restoration and protection strategies, and projecting the benefits to listed populations is a large and complex task that WDFW anticipates many watershed groups will complete as a component of a recovery plan for listed species in the Puget Sound region. As this work is completed, WDFW will incorporate relevant information into the HGMPs.

Comment 13. The ecological interaction risks posed by chinook salmon programs is not adequately addressed.

Response. The comanagers provided additional cross-program information on ecological interactions in the resource management plan for Puget Sound Chinook programs. Although we believe this information indicates that it is likely that the risks posed by predation are minimal, we agree that additional research is needed. Consequently, WDFW has initiated both intensive and extensive research studies assessing predation by yearling chinook salmon, coho salmon, and steelhead released from hatcheries in Puget Sound. We will be incorporating the results from

these studies, and an expanded analysis of ecological interactions, as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 14. WDFW incorrectly assumes that there is a "unique and narrow period of time during which an overwhelming majority of wild juveniles migrate downstream and out of the river basin."

Response. WDFW is unsure of the source of this concern. The HGMP for the Dungeness River coho program, as well as many others, includes the following information:

> "The release date of juvenile fish for the program can influence the likelihood that listed species are encountered or are of a size that is small enough to be consumed. The most extensive studies of the migration timing of naturally produced juvenile chinook salmon in the Puget Sound ESU have been conducted in the Skagit River, Bear Creek, Cedar River, and the Green River. Although distinct differences are evident in the timing of migration between watersheds, several general patterns are beginning to emerge:
>
> 1) Emigration occurs over a prolonged period, beginning soon after emergence (typically January) and continuing at least until July;
> 2) Two broad peaks in migration are often present during the January through July time period; an early season peak (typically in March) comprised of relatively small chinook salmon (40-45mm), and a second peak in mid-May to June comprised of larger chinook salmon;
> 3) On average, over 80% of the juvenile chinook have migrated past the trapping locations after statistical week 23 (usually occurring in the first week of June)."

WDFW agrees that the timing of migration of natural-origin juveniles is important, and will include all information that is available as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 15. No information is provided on the length-frequency distribution of juveniles released from each hatchery program.

Response. WDFW agrees that the information on the distribution of the lengths of juveniles released from each hatchery progam is important, and will include all information that is available as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 16. No information is provided on the length-frequency distribution of natural-origin juveniles.

Response. WDFW agrees that information on the size distribution of natural-origin juveniles is helpful in evaluating predation risks. The following table was included in the HGMP for the Dungeness River Coho and many other programs.

Table 3.5.1. Average length by statistical week of natural origin juvenile chinook salmon migrants captured in traps in Puget Sound watersheds. The minimum predator length corresponding to the average length of chinook salmon migrants, assuming that the prey can be no greater than 1/3 the length of the predator, are provided in the final row of the table. (NS: not sampled.)

	Statistical Week										
Watershed	16	17	18	19	20	21	22	23	24	25	26
Skagit [1] 1997-2001	43.2	48.3	50.6	51.7	56.1	59.0	58.0	60.3	61.7	66.5	68.0
Stillaguamish [2] 2001-2002	51.4	53.5	55.7	57.8	60.0	62.1	64.2	66.4	68.5	70.6	72.8
Cedar [3] 1998-2000	54.9	64.2	66.5	70.2	75.3	77.5	80.7	85.5	89.7	99.0	113
Green [4] 2000	52.1	57.2	59.6	63.1	68.1	69.5	NS	79.0	82.4	79.4	76.3
Puyallup [5] 2002	NS	NS	NS	66.2	62.0	70.3	73.7	72.7	78.7	80.0	82.3
Dungeness [6] 1996-1997	NS	NS	NS	NS	NS	NS	NS	NS	77.9	78.8	81.8
All Systems Average Length	50.4	55.8	58.1	61.8	64.3	67.7	69.2	72.8	76.5	79.0	82.4
Minimum Predator Length	153	169	176	187	195	205	210	221	232	239	250

Sources:

[1] Data are from Seiler et al. (1998); Seiler et al. (1999); Seiler et al. (2000); Seiler et al. (2001), and Seiler et al. (2002)..

[2] Data are from regression models presented in Griffith et al. (2001) and Griffith et al. (2003).

[3] Data are from Seiler et al. (2003).

[4] Data are from Seiler et al. (2002).

[5] Data are from Samarin and Sebastian (2002).

[6] Data are from Marlowe et al. (2001).

WDFW agrees that information on the distribution of lengths of natural-origin chinook is valuable, and will include all information that is available as the HGMPs are augmented during

the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 17. Recent research on the maximum length of juvenile chinook salmon consumed by coho salmon contradicts the WDFW analysis of predation.

Response. The maximum length of juvenile chinook salmon consumed by juvenile coho, steelhead, or chinook is likely to depend on a number of site specific factors. These factors may include the relative availability of forage items of alternative types and sizes, the condition of the prey, and the characteristics of the habitat inhabited by the predator and prey. Pearsons and Fritts (1999) conducted experiments under conditions "that would accentuate the possibility of detecting predation or predatory behavior. We confined predators and prey in small areas, provided no cover for prey, and restricted the prey type available to predators …". The lack of alternative sources of food for the 29 day period of this study appeared to have important consequences. The authors noted that the maximum relative size of food consumed during the initial 3 days of the experiment was substantially less than during subsequent 26 days of the experiment. "Eleven of 12 fish (92%) consumed before day 3 were less than 40% of the coho salmon's body length. The average of the maximum relative size of fish that was consumed by coho salmon before day 3 was 35%" (Pearsons and Fritts 1999).

The "33% of body length" criterion for evaluating the potential risk of predation in the natural environment has been used by NOAA Fisheries and the USFWS in a number of biological assessments and opinions (c.f., USFWS 1994; NMFS 2002). Although predation on larger chinook salmon juveniles may occur under some conditions, WDFW believes that a careful review of the Pearsons and Fritts (1999) study supports the continued use of the "33% of body length" criterion.

4.0 HGMP Section 4 (Water Source), General Comments

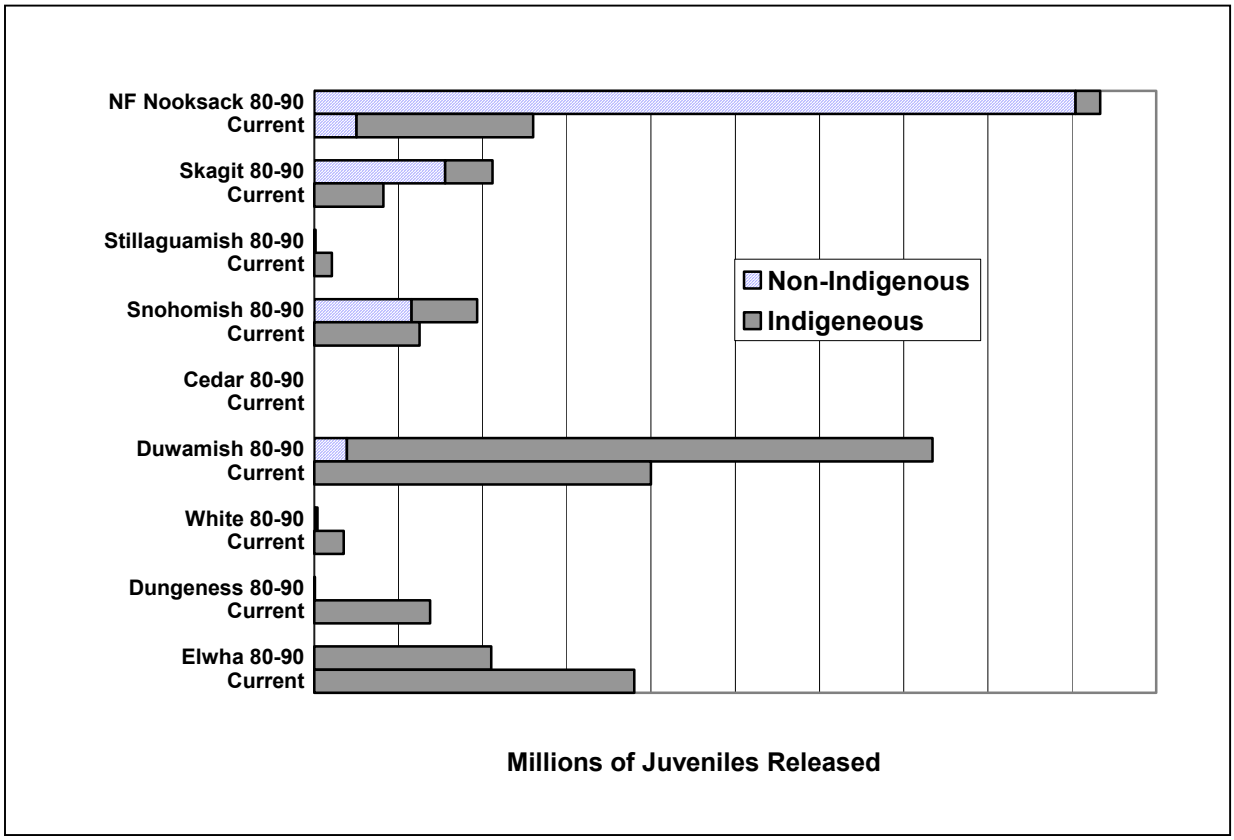
Comment 18. Additional information is requested on effluent discharge and associated risk minimization measures.

Response. The Department of Ecology has regulatory responsibility for implementation of the Clean Water Act in Washington, including the National Pollutant Discharge Elimination System. WDFW facilities are typically operated under a general permit for "Upland Fin-Fish Hatching and Rearing". The permit specifies the water quality parameters, sampling protocols, and reporting requirements for each permitted facility. Monthly and annual reports on water quality sampling and the use of chemicals at WDFW facilities are available from the Department of Ecology. WDFW agrees that the NPDES permit number and compliance record would be valuable and, if currently missing, will include it as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

5.0 HGMP Section 6 (Broodstock Origin and Identity), General Comments

Comment 19. Could an improved genetic pool for chinook salmon hatchery programs be developed by importing fish from Alaska or other non-local sources?

Response. The comanager resource management plan for chinook programs in Puget Sound (WDFW and PSTT 2002) provides a discussion of previous efforts by WDFW and other agencies to introduce non-local stocks into Puget Sound. In general, these efforts do not appear to have been effective, perhaps because the introduced stocks were not adapted to the biotic and abiotic environment typically encountered by Puget Sound chinook salmon. The lack of success, and the increased recognition of the importance of local adaptation, led WDFW to develop and implement in 1991 a stock transfer policy designed to foster the development of local brood stocks. As noted in the resource management plan, the use of non-local broodstock for chinook salmon programs has been eliminated or substantially reduced in rivers where locally adapted stocks exist (see figure below).



6.0 HGMP Section 9 (Incubation and Rearing), General Comments

Comment 20. Section 9.2.10 fails to discuss risk minimization measures for domestication, competition, and predation.

Response. WDFW discussed risk minimization measures in multiple sections of the HGMP including 6.3, 7.9, 8.5, 9.2.10, and 10.11. For example, WDFW interprets sections 9.2.10 and 10.11 of the HGMPs to address similar but different questions. Section 9.2.10 requests information on the "risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation (underline added)." Consequently, for the Dungeness River Chinook program (deemed essential for recovery by NOAA Fisheries), the HGMP identifies several measures (e.g., multiple rearing methods, release size) in Section 9.1.10.

In contrast, Section 10.11 of the HGMP requests information on the "risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish release (underline added)." In response to this request, WDFW discussed the risk aversion measures proposed to limit the risk posed by ecological and genetic interactions after the release of fish from the hatchery (e.g., Dungeness River Coho program).

7.0 HGMP Section 11 (Monitoring and Evaluation), General Comments

Comment 21. Detailed description of the monitoring plans and methods related to the performance indicators is not provided.

Response. WDFW concurs and will provide additional details as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

8.0 Wallace River Summer Chinook Fingerling Program

Comment 22. Rationale and advisability of incorporating natural-origin broodstock into the program is not discussed.

Response. An HSRG (2002) recommendation for the Wallace River Summer Chinook Fingerling program was to:

> "Improve broodstock management to ensure that the hatchery stock remains truly integrated with the naturally spawning stock. Introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases. Sunset Falls currently appears to be the best choice for this broodstock."

While WDFW supports the intent of this recommendation, the agency response noted that this simple recommendation addressed a "complex topic that will require additional analyses and discussion." These complexities include the abundance of the natural population, methods to collect a random sample from the natural population, and the proportion of the escapement to

natural spawning areas comprised of adults originating from hatcheries. When the comanagers have successfully resolved these questions, the rationale and methods for incorporating natural-origin broodstock will be included as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

9.0 Soos Creek/Icy Creek Fall Chinook Yearling Program

Comment 23. The gated culvert through which the Pautzke/Icy Creek holding ponds return flow to Icy Creek should be redesigned to prevent injury to fish.

Response. WDFW installed a removable trap at this location in September of 2003. The trap facilitates the safe capture and removal of chinook and steelhead of hatchery origin and, if necessary, the transport of fish back to the Green River.

10.0 Reiter Ponds Summer Steelhead Program

Comment 24. Is any information available on the number of summer steelhead released in the Raging River as juveniles that subsequently return as adults to the Tolt River?

Response. WDFW catch estimates indicate that some summer steelhead of hatchery origin are caught by recreational anglers fishing in the Tolt River (see table below). The catch estimates do not provide information on the exact origin of the fish, or the number of summer steelhead that are not harvested in the fishery.

	Raging River	Tolt River	
Smolt Release Year (Year N)	Summer Steelhead Smolt Releases (Year N)	Summer Steelhead Smolt Releases (Year N)	Catch of Hatchery Origin Summer Steelhead (Year N+2)
1997	0	0	0
1998	0	0	0
1999	21,700	0	9
2000	9,200	0	0

11.0 NF Nooksack Native Chinook Restoration Program

Comment 25. Recent information is not included regarding the number of chinook salmon originating from the Kendall Creek Hatchery that returned to the South Fork Nooksack River.

Response. The HGMP notes that in "1999 and 2000, 55.6% and 32.4%, respectively, of the carcasses surveyed in the SF Nooksack were strays from the NF Nooksack program." This information, in part, led the comanagers to reduce the size of the program from 1.6 million to 0.7 fish. Updates on the composition of the natural spawning escapement in the South Fork Nooksack will be included as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 26. A comprehensive genetic management plan has not been developed that will preserve the South Fork Nooksack and North Fork Nooksack population.

Response. As discussed in the response to Comment 25, the comanagers are monitoring the number and composition of spawners in both the North Fork Nooksack and the South Fork Nooksack rivers. Production of North Fork fish from Kendall Creek hatchery was reduced by over 50% when it became apparent that significant numbers of chinook salmon originating from that program were returning to the South Fork Nooksack River. The comanagers are also considering other potential actions, including the development of an artificial production for the South Fork Nooksack population.

12.0 Kendall Creek Coho Program

Comment 27. The cumulative impact of the 177,000 coho fry provided to "salmon-in-the-classroom" projects is not assessed.

Response. The commenter expressed concern that "177,000 coho fry are trucked off-site to be released by "salmon-in-the-classroom" projects into Nooksack tributaries at the same time that "critical" threatened Nooksack spring chinook are emerging from the gravel." The HGMP indicates that: a) 77,000 eggs are transferred to various schools and coo-ops in area with resultant unfed fry planted in various streams in watershed and independent streams; and b) 100,000 eggs are transferred to Lynden Christian High School with resultant fry planted in Fish Trap Creek. WDFW does not believe that unfed or fed coho salmon fry, likely of similar length to spring chinook, pose a significant predation risk to Nooksack chinook at the time the coho fry are released by the school programs. The risk of predation in the subsequent year is also expected to be minimal due to a low rate of survival from fry to age 1 premigrant. This information will be included as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

Comment 28. Adverse species interactions, especially predation, affecting members of listed fish should be considered direct take.

Response. The HGMP's have been prepared and submitted in response to rules and guidance promulgated by NOAA/NMFS under Section 4(d) 0f the Endangered Species Act (ESA). The HGMPs are management documents and are not intended to act as a description or outline of the Endangered Species Act and its legal requirements. Accordingly, there is no intention to use the HGMPs as a discussion of legal standards under the ESA and WDFW does not propose to modify the HGMPs for such a purpose.

13.0 Dungeness River Chinook Program

Comment 29. What is the measure for determining a self-sustaining chinook salmon population?

Response. NOAA Fisheries provides a conceptual description of self-sustaining populations in the report "Viable Salmonid Populations and Recovery of Evolutionarily Significant Units"

(McElhany et al. 2000). The report identifies four population characteristics that must be considered: a) population size; b) population growth rate and related parameters; c) spatial structure; and d) diversity. The Puget Sound Technical Recovery Team (PSTRT) has been charged with providing the technical basis for recovery planning in Puget Sound and has provided preliminary, population specific viability guidelines in a report entitled "Planning Ranges and Preliminary Guidelines for the delisting and recovery of the Puget Sound Chinook Salmon Evolutionarily Significant Unit" (PSTRT 2002). The report states:

> "The relationship between abundance and productivity for a particular population in a particular environment can be represented as a curve along which productivity decreases as abundance increases. The results for abundance that we present are in terms of equilibrium spawners, or the point in the relationship where productivity has declined to a level where one spawner produces only one adult fish in the subsequent generation (i.e., the population is just replacing itself). If the population intrinsic productivity is greater than replacement, the resilience of the population to environmental change is increased, and fewer spawners than the equilibrium level may be required to assure the viability of the population."

For the Dungeness chinook salmon population, the PSTRT identified a planning range of 4,700-8,100 equilibrium spawners.

Comment 30. How are wild salmon being protected from adverse genetic, demographic or ecological effects on chinook resulting from the hatchery operations.

Response. The origin and guiding objectives for the Dungeness River Chinook program are described in detail in Marlowe et al. (2001) and summarized in the HGMP for this program. Since the inception of the program, the potential risks posed by artificial production have been acknowledged and weighed against the critical status of the population. Risk containment measures described in the HGMP include: a) native broodstock were collected from the Dungeness River; b) efforts were made to collect eggs or fry from a diverse group of families; several types of rearing methods were used to minimize the likelihood of a catastrophic loss; b) release of fry, sub-yearling smolts, and yearling smolts at a time and size that mimics the natural fish migration habits; and c)limiting the length of the captive broodstock program to the 1993 through 1997 broods.

Comment 31. Is an integrated hatchery program the safest and most effective way of restoring indigenous chinook salmon?

Response. The Dungeness Chinook program was initiated after it was determined that the natural population was in significant danger of extinction. Artificial production provided, at a minimum, a short-term solution to maintaining the population under extremely adverse environmental conditions. As noted in the HGMP, long-term recovery of a natural population "will be largely dependent upon the ability to restore fish habitat in the Dungeness River."

Comment 32. Why isn't the adipose fin clipped on the hatchery-origin chinook salmon to provide a means to distinguish them from chinook salmon of natural origin?

Response. The adipose fin of hatchery-origin chinook salmon may be clipped for several reasons, including: a) to estimate the percentage of juveniles (at traps) or adults in natural spawning areas that originated from a hatchery; b) to identify chinook salmon of hatchery or natural-origin for use in hatchery spawning protocols; and c) to provide opportunities for mark-selective fishery harvest of hatchery-origin chinook salmon. Since the Dungeness Chinook program was implemented to increase the number of spawners, not provide fishing opportunities, an adipose fin clip was determined to not be an appropriate mark for releases in 1998 and subsequent years. Instead, all production can be identified through one or more of the following marks: a) coded-wire-tags (CWTs) provide estimates of catch distribution, marine survival, and fishery harvest rates; b) blank-wire-tags (BWTs) facilitate non-lethal identification of hatchery-origin juveniles or spawners; c) marked otoliths recovered from spawner carcasses provide estimates of the percentage pf adults in natural spawning areas that originated from a hatchery. Additional information on marking protocols may be found in Marlowe et al. (2001).

Comment 33. What has been the performance of the program, including smolt-to-adult survival rates, adult production levels, and escapement levels?

Response. The 1996 brood was the first year with significant releases with a production of 421,000 fry and 1,353,000 fingerlings. Since chinook salmon in Puget Sound typically have a life span of 3-5 years, this brood would be expected to contribute to fisheries and spawning escapement primarily in the years 1999 through 2001. Analysis of the data collected in these years is now occurring and will be included in a revised submission to NOAA Fisheries of the HGMP for the Dungeness Chinook program. Preliminary results suggest that smolt-to-adult rates have ranged from 0.01% to fingerling released into acclimation ponds to 0.5% for a yearling release at Hurd Creek Hatchery (a satellite station for the Dungeness Hatchery). Despite these relatively low survival rates, preliminary results suggest that adult returns from the program comprised a significant percentage of the total number of spawners in natural spawning areas in 2000 (>50% of the 218 spawners) and 2001 (>90% of the 453 spawners).

Comment 34. Will the program end in 2004? If not, how can program performance be improved to achieve the wild chinook escapement goals?

Response. The comanagers are reviewing the status of the Dungeness chinook population, the performance of the program, the availability of funding, and the recommendations of the HSRG to determine if the program should be extended. The HSRG (2002) provided several recommendations, including:

a) Consider phase-in of a new hatchery program that does not involve captive broodstock, but continues the goal of maintaining genetic resources and reduces the risk of extinction.

b) Size the hatchery program (adults used, smolts released) to match riverine carrying capacity,

c) Discontinue zero age releases in July and August. Provide the capability to produce a mix of zero-age and yearling chinook.

14.0 Marblemount Winter Steelhed

Comment 35. No data or analyses are provided to support the claim that the Chambers Creek stock is segregated genetically and temporally from the natural winter steelhead population.

Response. Phelps et al. (1997) compared genetic samples collected from natural-origin winter steelhead in two time periods - 1975 and 1993-1996 with Chambers Creek Hatchery steelhead. Analysis of genetic distances indicated that gene flow from hatchery fish of Chambers Creek origin to naturally spawning populations in the Nooksack River, Skagit River, Stillaguamish River, and Skykomish River "has been minor and has not been widespread over the past twenty years." Also, Skagit Basin natural steelhead samples were genetically more similar to each other than to samples of Chambers Creek-origin hatchery populations. Samples were not available to determine if gene flow from Chambers Creek origin steelhead to natural populations had occurred prior to 1975. It is not possible from the analysis, however, to determine if gene flow from winter steelhead of Chambers Creek origin to natural populations occurred prior to 1975. Further substantiation of the segregation of these populations in the Skagit River is provided by an analysis of spawn timing. Spawning by natural-origin steelhead is rarely seen prior to mid- to late-March, with peak spawning occurring in mid-May. This results in a less than 1% overlap with winter steelhead of Chambers Creek stock origin. Information on the segregation of natural and Chambers Creek-origin will be included as the HGMPs are augmented during the iterative, ongoing review leading to the distribution of the Final Environmental Impact Statement.

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